SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT(SEIS) TO EVALUATE THE POTENTIAL DESIGNATION OF ONE OR MORE DREDGED MATERIAL DISPOSAL SITE(S) IN EASTERN LONG ISLAND SOUND

DECEMBER 9, 2014

3:08 P.M.

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(The hearing commenced at 3:08 p.m.)

DR. HAY: Welcome to this public meeting. Thanks for coming out on this lovely balmy afternoon here. So before we start, a couple of housekeeping measures. We don't have a microphone so if you have difficulty hearing, please move to the front. There are lots of seats up in the front.

Secondly, the bathrooms are outside just outside the hallway. Not outside the building. The sign-in sheet, I hope everybody had a chance to sign in. Also, if you want to make a comment at the end of this presentation, please also sign in. There is a sign-in sheet there, although there will be an opportunity to ask questions that you may not anticipate at this point.

Finally, please turn off your cellphones or any other kind of audio devices so that we don't get interrupted or put them on vibrate. My name is Bernward Hay. I'm with The Louis Berger Group. We're under contract to the University of Connecticut, which is under contract with the Connecticut Department of Transportation, and we're working together for the DOT and the EPA for the evaluation of potential dredged material disposal sites in open waters in the Eastern Long Island Sound region. So the EPA is the lead agency from the Federal side for this project.

Parallel to this meeting there was another meeting yesterday in Riverhead in New York, and today's meeting will focus on the findings of a physical oceanography study that was conducted for this Environmental Impact Statement. This will be presented by the University of Connecticut, Frank Bohlen and Grant McCardell, and it will be an informational meeting. So as a result, there won't be any specific comments or any specific comment period.

The meeting will be introduced by Ms. Jean Brochi. She's the project manager with EPA for the Ocean and Coastal Protection Unit, and she will provide a project status to see where we are in this process, and we have a 50-minute presentation by Frank and Grant, and after this the floor will be open for questions and comments.

The meeting will be recorded by a stenographer and also an audio recording device, and the transcript of the meeting will be made available to the public later on EPA's Web site. So with that, Jean?

MS. BROCHI: Thanks, Bernward. I probably need a mic. So of all of the speakers you will hear today I am probably the one that needs a mic. So if I talk too fast or you can't hear me, just raise your hand. I will repeat or I will stop.

Again, I'm Jean Brochi from EPA Region One, and I just wanted to introduce a few folks that are in the room as well with me. They're members of our cooperative agency group, and it includes Brian Thompson, George Wisker from DEEP. Joe Salvatore from Connecticut DOT in the back. We've got Todd Randall from the Corps of Engineers, Mark Habel from the Corps of Engineers New England. We have New York DEC and DOS representatives as well as EPA Region Two folks that came to last night's meeting in Riverhead, New York.

So you're here, because you are interested in the Eastern Long Island Sound Supplemental Environmental Impact Statement, and, again, I'm representing EPA Region One. So Bernward already went through the agenda. We will have Frank Bohlen and Grant McCardell show results of a physical oceanographic study.

So if you haven't been to previous meetings, we had a few introductory meetings on this process, and this has been going on since 2012. This meeting is going to be a summary of some of our responsibility and really just an update on the process, and then I'm going to give it to the University of Connecticut folks.

So EPA and the Corps of Engineers share responsibility for dredged material. EPA through the Marine Protection Sanctuary, Research and Sanctuaries Act, Section 102, has the authority to designate dredged material disposal sites. The Corps has, under the Ocean Dumping Act, Section 404 has the authority to select disposal sites.

There's a difference. The designation that EPA would use for dredged material sites is long term. We both manage and monitor sites. EPA, when we designate a site, we issue a site management monitoring plan, and that's also a shared responsibility that we partner with the Corps on.

Now, for permits, as you know, that's directly to the Corps of Engineers, and EPA has authority for the testing, to review the testing and make determinations on suitability. So the history -- a little history of the disposal sites.

You know that in 2005 EPA entered into an Environmental Impact Statement and designated Western and Central Long Island Sound. This is a supplemental for the eastern part of The Sound only, and the sites that are part of this effort include the Cornfield Shoals site and New London site, and both of those sites were selected by the Corps of Engineers. And the two sites, Cornfield and New London, expire December 2016, and here are the sites.

So you have Central and Western and then the focus for Eastern, New London and Cornfield. So, again, EPA's role in dredging is to review the permits, designate disposal sites. We promulgate the regulations. We develop site management monitoring plans, and then we manage the sites with the Corps of Engineers. So the initial approach to this effort was to look at site screening, and we looked at five general criteria and 11 specifics, and all will lead to what we had done in the first EIS.

These are site selection criteria that are in the Marine Protection, Research and Sanctuaries Act, and so what we cover for some of this information is biological resources. We will be looking at conflicting use. We will be looking at sediment environment as well as physical conditions, and one of the aspects that was so most interesting to EPA and what you will hear more about later on is the physical conditions and the sediment transport at sites such as New London and Cornfield where they are so different in characteristics.

So the initial screening process started with 11 sites, and of those sites they included some historic disposal sites and the active disposal sites. For the historic sites those were sites that we knew had some dredged material disposal at some point in time. Most of them were in the 40s, and that was what the Corps of Engineers gave us for their official record.

So the 11 sites we initially screened, and they're listed on the bottom here. Active sites are included in that, and then from that group we narrowed it down to Cornfield Shoals disposal site, Six Mile Reef, Clinton Harbor, Orient Point, Niantic and New London, and those sites are still being evaluated.

So for the physical oceanography study you can see -- in the yellow block you will see the names of some of the historic sites and then -- it would be great if this worked, but -- there we go.

DR. BOHLEN: No, here.

MS. BROCHI: Thank you.

DR. BOHLEN: That's me.(referring to a laser pointer)

MS. BROCHI: Listen. Don't take my

steam. You are coming up next. There we go. So the yellow is historic, and the bluish white are the active sites, and what you are looking at is the disposal sites in red, and then for the green are the buoys that were placed for this physical oceanographic study that was conducted by UConn, and these black lines right here, I think Frank will go into more detail, is the zone of siting feasibility, which was established for the Environmental Impact Statement.

It's a busy slide so I will keep it up for a minute. So the process again, we started out the process October 16, 2012 with the Notice of Intent. Several folks had come to that meeting. We had an official comment period for that Notice of Intent, and since then we have had several public meetings as well as cooperating agency meetings.

At one of the June meetings, it was June 25 and 26, a representative from Sarah Anker's office requested that we try to reach out and do some more education. So EPA Region One and Region Two hosted a webinar on dredging, dredged material, dredged material equipment, and that was April 3, and that was well attended. I'm not sure if some of you folks were in there. I haven't looked at the sign-in sheet.

So if you are new to the process or you are interested and you haven't received notifications, please, again, you can e-mail me directly, I'm Jean Brochi, or you can e-mail the elis@epa.gov e-mail address, and we will add you to the distribution list, and we will also send out notifications whenever we're going to have a meeting, whenever we're going to post something on the EPA Web site.

The EPA Web site address is right here, and the minutes from the meetings, the documents, the studies will all be uploaded onto that Web site. There are people writing. I'll just leave this on for a few minutes.

Okay. So the next step draft, environmental, Supplemental Impact Statement, and rulemaking in the spring of 2015. We will at that point have additional public meetings for an official comment period on that document. And then if the SEIS recommends a designation of one more or sites, we will issue a final SEIS and rulemaking by December 2016. That's all I have. Thank you for coming and Frank is up next. I will give you back your laser.

DR. BOHLEN: Good afternoon. I'm Frank Bohlen. I'm a physical oceanographer on the staff at the University of Connecticut Department of Marine Sciences. Physical oceanographer. I ain't no biologist. That's what that means. The physics of the ocean. And I'm here to talk about the study of the physical oceanography of the zone of siting feasibility.

It's important to realize what the talk is not. We're talking about the physical oceanography, circulation, currents, waves, and the factors that affect the movement of materials. You are going to hear a lot about boundary shear stress. We hear a lot about stress these days. This is boundary shear stress, the force that's going to be exerted on the bottom. And if the material fails, the material, because of that force loading, may be transported. So that's the physics of the process that we're going to be looking at.

Physical oceanography of the zone of siting feasibility I just told you the why of it. The how of it. We just can't go out and measure everything we want to know about every point in the field. That's a fair amount of area. You saw it on the earlier slide. So the best way to do that is to build a numerical model of the system. And we're all very familiar with models. We wake up to the results of models on your weather forecasts. We live with models, and they're modeling everything from your voting preferences to what you eat and what you don't eat sort of a thing.

So you understand models at least in concept. The model is just that, one man's view of what the system is, how it functions, and that can be less than perfect. So what we try to do is, to the extent possible, to verify the results of the model, and to do that we take a series of measurements. Not as many as we might like to get, not as long as we like to get them. You talk to scientists. You guys are always cursing the scientists. They're saying, damn it, we always want more data.

But we get a fairly representative set of data and use it to calibrate a model. That will give us information on a much smaller, spatial scale, time temporal scale, than we could ever hope to do by taking direct measurements. That's the model.

We will talk to you a little bit about how we go about evaluating, the instruments that we're going to be using, and then what the results look like, what the model tells us about the currents that may affect the dispersion of materials that are in the water column either resuspended from the bottom or entrained when you dispose of a couple of cubic yards of material in a dump, okay?

And then the boundary shear stress. If the stuff gets to the bottom and sits there under normal circumstances, under what condition might that stuff start to move around, okay? And then we will summarize the results.

Let's start out with a little bit of the physical oceanography. I told the gang yesterday that it's only right that we start with the physics of the system, because physics is, after all, the queen of the sciences, and everything else is simply handmaiden to the queen, okay? So physical oceanography, the science that explains the paths of ocean circulation, distribution of a property, blah, blah, blah. You can read it.

But of particular importance within this study are the factors governing boundary shear stress. Boundary shear stress. If we had a better rug, we could get the rug moving, okay? The force that's exerted, a horizontal force that's exerted on the bottom because of a gradient in the velocity as we approach the bottom. We have some wind movement over this floor here. If you can believe it's moving here pretty uninterrupted, and as it gets closer down to the floor, the flow is more and more influenced by the floor.

So there is some frictional drag on the velocity as it gets down to the bottom. That gradient and velocity from the free stream value to the boundary value produces a force on the bottom, horizontal force, a force per unit area, and the units we're going to be talking about are pascals. You can go out and look it up, pascals. You are familiar with pounds per square inch. You may have heard of Dynes in your physics class way back when. This is just another version of that force. And then we have a force per unit area, a shear, a horizontal force.

You hear of pounds per square inch, and a millibar, as a vertical force through the atmospheric pressure. This is just a horizontal version of that same sort of thing. By the way, we speak our own language. We tend to speak our own language, and sometimes we take for granted that everybody knows what that word means.

But on occasion we find -- on more than one occasion we find that's not so. Don't be afraid to say wait a minute. There are no silly questions. So don't be afraid to say wait, wait, wait, wait, wait a minute on that for clarification.

For substantive response we have to wait till the end of it.

So of particular importance within this study are the factors governing boundary shear stress, because it might affect the movement of sediment. This is a very simple picture (slide) that's not entirely appropriate, but it's one you often see in the textbooks when they talk about the forces acting on a sediment particle.

Now, why isn't it entirely appropriate? Because they're showing you discrete particles sitting here. Here is a sand particles sitting in the presence of a number of other sand particles. A bunch of billiard balls laying on each other, marbles, right? Got Bee-Bees? Pick a size. Got it? Not entirely appropriate, because the sediments that we deal with tend to be in structure quite a bit more complicated.

They're not simply one particle or another particle held together by gravity. They tend to be one particle, another particle quite small held together by lots of different gluing factors, gluing factors such as electrochemical binding. The magnetic attraction between the particles, or a biological film, mucilaginous matrix that's on the bottom. Kind of gooey-looking stuff. You can see it. On shellfish it's not uncommon at all, okay?

So what we tend to deal with is an assemblage of particles that we class as being cohesive. This sort of picture, simple picture you have back here really applies to the noncohesive class of sediments that you are all familiar with in terms of beach sand. That's a good example of noncohesive sediment. But it's okay when you start talking about drag on the bottom, and drag, of course, retards the flow, builds up that force that we were just talking about, the shear stress that particles can be moved.

The bottom also influences the near bottom velocity in a variety of different ways. In this case they're showing you how a sand wave field, nice, rhythmic sand waves, you have seen them off the beach maybe when you're laying-floating, you're facing down in the water and you are sort of hanging there, you can see the waves coming and building little sand waves, ripples in the bottom.

The velocity gets quite complicated over a structure like this, and you will see a number of instances in the study of the velocity field that we're looking at. We're interested in that, because that's what's going to affect the boundary shear stress displays quite complex characteristics.

The famous diagram, the Shields diagram, the only reason I put this up here is to show you that there is a class of sediments that is cohesive, a class of sediments that is noncohesive, and they're going to display different response characteristics to a given velocity field, and it's going to vary as a function of particle size. The velocity of the shear stress is buried in this parameter, okay?

So you can see there's a difference between cohesive and noncohesive. Maybe it's clearer when you look at something like this in tabular form where I'm only going to emphasize this -- what does that say? I can't quite see it. Stress at the initiation of motion. Stress at the initiation of motion. The stress that it's going to take just to get that particle to start rolling along.

And you can see here this is in pascals, as I said. That if you are dealing with course sand, you may have a value of 0.48, and it's interesting. It's counterintuitive that as the grain size goes down so medium, fine, very fine, course silt, medium silt, fine silt, and beyond that would be clay, and you can see here in terms of grain size, the diameter in millimeters, you are starting about a half millimeter.

You ever calibrate the sand? You sit on a beach, you know, what you feel good about. There are people that do that. If you sit on a beach in England -- of course, if you are a Brit, you can sit on golf balls, and they figure that's a very nice afternoon on the beach, okay, the cobble, the typical British cobble beaches. But around over here if it gets too fine, you stand up and you sort of have all the sand stuck to your back. You don't like that either.

So it's about quarter of a millimeter or a half millimeter sand. It's what you see on a lot of beaches, and there are a variety of sands when you go along Fisher Island Sound's coast beaches. You will see a variety of sand sizes. That's just to give you -- you've got to develop a feel for this stuff, okay? You got to -- it's cohesive like bring it in here and slop it on the table.

Counterintuitive, he says. What's that mean? Most folks tend to think of transport in terms of grain sizes simply. So they have this idea that since it's more difficult for me to blow sand off the table than it is to blow flour off the table, right? Can't you see it? Flour, okay? Makes a hell of a mess. That if we have fine grained sediment, that stuff must move more easily than if we have coarse grain sediment, not true, and it's not true for a variety of reasons.

But to begin with, and the simplest one for you to understand is, wet that flour. On your countertop make a mess for mom. Wet the flour. You got a nice gooey mass of stuff. You got to wash it off your hands, okay? When that stuff gets wet, it's cohesive, extremely cohesive. And when I go (blow sounds), I get it on the floor before I get that stuff to move, okay.

So that's what they're trying to get through to you is that the simple relationships between grain size and transportability you got to revise -- a lot of people have to revise their thinking, okay?

Now, out of this the only reason we put a red box around this we sort of picked a range in the three quarters of a Pascal, you will see more of this later, as the level that we're looking at is sort of the critical level. The material we're playing with, there's some field data to back that up. But I want to show you this again to reinforce this cohesive/noncohesive component when you begin to think about how these mounds of sediments are affected by a flow.

Okay. Here we are. The objective of the physical oceanography study is to take a look at the distribution of maximum bottom shear stress through the zone of siting feasibility. It runs from Guilford to Mattatuck, western boundary, Montauk to Block, Block to Point Judith, pretty good patch of water, and, you know it to be, I know most of you that are out there, a moderately dynamic patch of water.

I'll show you some depths in a couple minutes. These are the stations that are being looked at, okay? You just heard about them, and there is a variety of them sitting up here. There are only two active, the Cornfield and the Fishers Island, the Eastern Long Island Sound, sorry, New London site and Cornfield.

There are a number of historic sites, and there are 3 or 4 -- I think there are the 1, 2, 3, 4 new sites that are on there I picked out, okay? To characterize the circulation, that's the water column characteristics, we're looking at how the water column moves, and acquire enough physical oceanography data to support the verification of this numerical model that we're going to be using really to look at transport characteristics in detail, the study will.

That's a mess (referring to a slide). The only reason I show you, Long Island Sound, these are the old DEP stations over the years since the early '90s, and I wanted to point out M3. It's important down here. You can't read M3, but it's in The Race just off Fishers Island, because -- in a minute it will show up.

You recognize that there are a number of factors that govern circulation in Long Island Sound. Most of us think of the tides. Comes to no surprise there, right? Take a look out the window, and you got a fair idea of tides going. You go for a sail, and you are influenced by the tides. Your front yard is influenced by the tide today if you took a look there, okay?

But there is also the matter of fresh water inflows. Fresh water inflow show this regular seasonal variability with a peak discharge value typically in April/May. So we can expect to see some amount of seasonality in fresh water inflow. The fresh water inflow in combination with the temperature can affect water column densities, and the water column density, just like the atmospheric the air density that influence high and low pressures and influence winds, will influence circulation in the waters.

So now you have tides coming and going, yin and yang, and you have possibly some density-driven components as well associated with temperature and salinity. It shows the seasonality. The seasonality result looks something like this. These are three profiles along the axis of The Sound. Here is M3 sitting down in here, okay? You start down at the end at Throgs Neck, more or less, and you can see, if we look at April, August and December, that there is, in terms of water temperature, some evident differences in the vertical structure.

You see much more stratification in the summer. Surface waters are warmer. Bottom waters are significantly cooler. That makes for some differences in terms of vertical exchange, and you have heard about it in terms of hypoxia and the like, but you can also believe that the seasonality that you are looking at here from April, August and December, the differences in temperature -- go out there right now, the water temperatures are less than they were in the summer. Go out there yesterday, they were less than they were last weekend sort of thing. It's cooling down. It might influence the density.

We go along and take a look at salinity, it's a little more subtle. But, again, you are going to see this is higher salinity waters, okay, the shelf waters, and you are going to see some differences in the extent of intrusion when it starts coming in.

This guy is April. We got a lot of fresh water coming out so The Sound, greater body of The Sound is somewhat fresher. You come into the summertime, and this guy in here, this will vary not only seasonally but year to year depending on what the wind condition looks like.

Just real quick. You know this. This is on our Web site (referring to a series of slides). You can take a look at this. If you want to play with it, you can just run the cursor. But I only show you this to impress you with the fact that there is a significant spatial variability in the velocity field in Long Island Sound, and, again, most of you know it.

You don't see much in the way of currents in the western Sound. You see a fair amount of currents in the eastern Sound. The Race area is moderately energetic, okay? That guy's on the ebb. It's decided not to like us (slide show malfunction). I don't know. Well, if it was working, we turn it around and show it going the other way, okay, and you are going to see a significant amount of spatial variation in it, and it will -- if it doesn't -- there you go, okay? You can plug that in and play with it, get an idea that there is a significant spatial component to the tide. There is a significant time component to the tide, okay?

Now, just to impress you with all of that, can we impress you with the technology that's possible today or not. Can we shut it down? (set to run a video showing surface salinity distributions from a computer model)

(Whereupon, there was a discussion off the record.)

DR. BOHLEN: It's nothing you don't know. That's the other thing that's sort of frightening about school and education, right? If you just stop for a minute and think about it, you heard it in kindergarten or somewhere. You just sort of brighten this up.

So what I'm telling you about

circulation in Long Island Sound in general characteristics you probably know pretty well. Speak.

MR. ALLYN: You don't have --

COURT REPORTER: Sir, what's your name?

MR. ALLYN: Lou Allyn. Do you have a slide that in the future maybe you can talk about how many people you have working on this project with you, what the organization of the staff is?

DR. BOHLEN: Yeah. Jim O'Donnell is the principal investigator, he's not here today, myself, Grant, we have another post-Doctoral investigator, and we have two technicians who are on the project.

Video beings to run

This is a model run if you look up in the top, it says 10/21, and it's just real quick running through a tidal cycle and higher salinity water out here, okay? Lower salinity water back in here. Outflow of the Connecticut River, okay.

And if you keep running this, and we could run this, but we don't have enough time to run it -- I saw they gave us a deadline of time -- you could run this right on through Sandy, which was 10/29. This is 2012, okay, and beyond, because the

Sandy effects in the system, you pulse it, and then the system responds over the course of four or five days.

So the storm occurred on the 29th, and you might look to see what was going on on the 31st or so. But just to give you an idea -- and, again, some of you have seen this, the plume coming out on the ebb, casting waters that come down. Sometimes when there is a larger discharge, you will see the discharge right into the, down into The Race and into Plum Gut.

But you will generally always see a nice frontal zone in the vicinity of the Connecticut River. You may not see as much as in the case of the Thames. But if we ran this a little bit longer, we get a good rainfall after Sandy. You will see this guy coming out and getting very close over to Fishers.

So we're dealing with a spatially and temporally variant system, and the problem -- the question, the project goal is to assess what that means in terms of circulation and boundary shear stress, okay? Let's go back to the slides.

Well, you saw it. Again, this is just sort of a summary slide. We're really ahead of ourselves here. We are showing you some model results in the blue, but the red or green observations are a couple places in the study area, and you have to look at this carefully to realize there's a difference in scale here, but you are seeing waves down in this area that might have a significant wave height of about one and a half meters, 1.4 meters.

We get further in, Six Mile Reef down in here, you will see waves that very seldom get over about one meter or so. This down in here is just about a meter. So there is some spatial variation as you would suspect, okay? An area a little more sheltered, an area a little more prone to the wind effect, because the water depth and the like there and some other spatial variations. We will see more of this when we get into the results of the model, okay?

So just the background of the physical oceanography of Eastern Long Island Sound, which I hope just reinforces what you already know. Next one (slide). So Grant will tell us a little bit about the model.

DR. MCCARDELL: So what we want to use the model for, as Frank was just telling us, is to be able to sort of fill in all the gaps for what we cannot measure both in space and in time. We can go out there. We can put something on the bottom. We can deploy it till the batteries run out. We can get a month or even 60 days worth of data, and we can do that at one location with a broad-reaching study like this. We can even do it at seven locations, but we can't do it everywhere, and we can't do it through all time.

So what we want to do is we want to answer the question of what's the spatial distribution of stress throughout this entire study area. So how do we do that? We are going to run this model, and we're going to be able to then answer the questions about where the regions are where the stresses are the largest and the stresses are the smallest, and then the other question that we will be able to answer at some point is where does the material in the water go. If it does get eroded, where will it go?

And to do this we're using a model called FV-COM, which is the Finite Volume Community Ocean Model. It's been developed by UMass up in New Bedford and we're nesting it -- this is our model domain here extending out onto the shelf. At the shelf boundary here we are driving it using this larger model, which covers the entire northwest Atlantic.

Our model is forced by tides along

this outer boundary. The water goes up and down, which forces the water in and out in an appropriate manner. We're forcing it with observed river flow, these green arrows, and we're getting that from USGS gauge data. So for any given day we're replicating what was the actual river flow in the Connecticut River at that day.

In terms of the warming and the cooling for the heat, we're using climatology, and by the word "climatology" here what I'm talking about is "what are typical conditions at a given date and location." In other words, the climatology for Fort Trumbull here for today is probably that it's 35 degrees and overcast, and temperature, yeah, we're pretty close to climatology today. In terms of precipitation we're probably not very close to climatology.

Think of climatology as sort of like the Farmer's Almanac of what are the typical conditions for a typical location for a particular week or month, and so that's what we use for the surface heat exchange. So we're not modeling individual years for the surface heat exchange, and we're also not modeling individual years for how we start this up, but we do run it for long enough that we then are able to model individual years. Next slide.

So how does this whole thing work? Well, this works on an unstructured grid. It's finite volume. I'll show you what that means in a minute. It's a primitive equations model. What that means is it works according to first principles. It works according to Newton's laws by F equals MA. So it starts from the very, very basics, and it solves the equations that were derived from Newton's laws by Navier and Stokes in the early Nineteenth Century, and they derived these equations, but they were unable to solve them.

But fortunately we can approximate numerical solutions to these equations with computers. And so what we get from the model is we get the water velocity; get the sea surface height; get temperature and salinity, and then the model iterates itself. It says "okay, here I am. What's going to happen next?" and the model runs on a time step of 6 seconds.

So every 6 seconds of real world time we do this calculation, and then what we're interested in getting out of the model for this study is the stress. That's tau, the Greek letter tau we use to represent the stress, and that's the product of the water density times rho. (That's the thing that looks like a P) there times this C sub D, which is the drag coefficient -- Frank will talk to you a little bit about that afterwards -- times the square of the water velocity. U is the east-west velocity. V is the north-south velocity.

You can think of it (pointing to u-squared plus v-squared) as just the square of the magnitude of the velocity, and it's important to realize that it's the square of the velocity. What that means is that a small change in the water velocity will equal a bigger change in stress. If I double the water velocity, I will quadruple the stress, and this is the way the model calculates stress, and this is also the way, as you will see, that we have determined to be one of the more robust methods to calculate stress out in the field as well. Next slide.

So here is our entire model domain again, and like I say it runs on these little triangles. So for every single one of these little triangles we're solving the full equations of motion, and our model domain right now has about 30,000 triangles, and it does this at 15 different depths. So we're modeling about a half a million discrete finite volume fluid elements, and we're solving these equations at a real world time of every 6 seconds across this domain.

So needless to say 10 or 20 years ago we couldn't do this. You need state-of-the-art computing equipment to be able to run this sort of model. Now our study area here is this red box. Next slide.

And you can see the little triangles here, and so here is The Race. There is the Connecticut River, Niantic, I'm sorry, Niantic Bay, the Thames, Connecticut River over here, and these little triangles are what the model is running on. So the resolution of our model is those little triangles.

And it's important to note that this is the resolution of our grid; it's about 100 to 500 meters, which is about a quarter of a mile so we're resolving down to a quarter mile. So we're resolving the individual dump sites, but we're not resolving whether or not we cut off a little corner of one of the dump sites or whether we move the border of one of the dump sites by 100 feet. Next slide.

So how well does this model do this? Well, this is sea level that's coming from the model (being forced at the boundary like I said) compared to data at the Bridgeport gauge, and it's doing pretty well. The model is in blue. The data is in black, and it also does very well for temperature and salinity as well, and this is throughout the entire domain.

And we determine something called a Skill is, and what the Skill is, is what's the error in the model from 100 percent. So if the model was perfect, it would have a Skill of 100 percent. A Skill of 90 percent means that the model is staying within about 90 percent of the data. In other words, there is about a 10 percent error in the model. That's about a 10 percent error in velocity as well.

So if I square that 90 percent Skill, because the velocity is square, I come up with a Skill for the stress of about 80 percent. So, in other words, these stress values you probably can take as being plus or minus 20 percent, and spatially it's probably even better than that.

So our model is working very well in the world of physical oceanography and ocean models -- and atmospheric models, for that matter. I should add that atmospheric models work on this exact same set of equations. They model fluid flow whether it be air or water. And in terms of model skills our model is doing very, very well. These are very, very good numbers. Next. And how good is the stress and what's the stress? Well, that's why we had the field program.

DR. BOHLEN: So we're going to go out and gather up some data to verify all of that and, again, within the zone of site feasibility, and we selected seven sites, and it says deployed instruments on 7 bottom tripods on two, sorry, three two-month observation campaigns, you will see the three campaigns, to observe spring, fall and winter conditions at locations having different stresses.

How did you pick out these seven sites? They're not coincident with any of those boxes you saw before. They're close on some cases, but that wasn't the issue. We have run stress models before in this area, and we were looking to get data at a variety of locations that would give us a variety of conditions.

So don't put all your instruments within a quarter mile of each other. Pick out a number of locations that are going to give you a range of answers. So what you have the seven sites here going from roughly Six Mile or so down in here out close to Block.

We conducted three campaigns -- you will see it in a minute -- three campaigns, and during each of those campaigns there was also a survey, shipboard surveys. We went out to service the array so we did measurements along the transects. So there is a variety of data gathered up during these campaigns, six cruises with water column measurements at the seven tripod locations plus four additional stations in between, okay? Next.

Here are the campaign periods we had, spring, summer and winter. Conditions you are familiar with, the seasonality. You saw at least in stream flow, that there was a clear seasonality. You saw, I hope, in the temperature and salinity that there was something of seasonality, and you can probably believe that if we looked at the wind field, there is something of seasonality in the wind field.

We generally believe that the highest winds are during the transition periods in the spring and in the winter, sorry, spring and in the fall, okay? And so we have a spring campaign that's March to May, 66-day -- all around 60-day campaigns. When we had high river flow, you saw that April typically, generally high winds. Summer, low everything. Sailors know that all too well, right?

And then winter was November through January where we had low river flow and a fairly energetic wind field, okay?

So we put out these arrays. This is a triangular array (referring to slide). We can get an idea of what it looks like here, stands about 6 feet or so tall, okay, and it has a variety of instruments, and I can spend all afternoon talking about the instruments to you. So if there are questions, we can do this later.

But to begin with you had an acoustic Doppler current profiler. You are going to hear a lot about ADCPs if you start playing with oceanography these days. That's how we measure currents these days. In the old days you put out a current meter at a discrete point, maybe a number of them over the vertical. So you had this array of instruments sitting over the vertical.

Now we have a single instrument at the bottom that can project an acoustic beam through the water column. And if we segment up the reflection, if you will, of that acoustic beam back to the sensor package, I can tell you what the currents look like at layers through the water column. In this case this is an RDI acoustic Doppler current profiler, and it's looking up, and it's giving us one meter slices through the water column to the surface through the bottom, okay?

We have another instrument sitting on here. This is a Nortek acoustic Doppler current profiler, same ADCP but very different instrument. This is what they call a pulse coherent instrument, which allows you to make very fine measurements. This thing is mounted about three-quarters of a meter above the bed, and it's measuring currents every centimeter down to the bed. So we're really slicing up that portion of the boundary layer that's coming down right onto the bed that I told you was important in terms of boundary shear stress.

Now, that current is very, very -- as it gets down at the bottom is very important. We're measuring it. We can measure it. We can take a look at it. We can also see that Grant, in his model, the values for the velocity in that profile.

There is also a temperature salinity sensor over here, that's what the SBE is, and then there are two optical sensors here looking at suspended material concentrations. These are optical back scattering probes, OBS, that measure the concentration of suspended materials at a couple of points over the vertical. The rest of it has to do with the recovery.

So we get water column currents and waves from the ADCP, RDI. We get currents and stress at the bottom. That's the Nortek. We get suspended material concentrations. We get temperature and salinity. We put this thing out for 66 days. It samples once every 15 minutes and it bursts samples. That means that it runs for a period of time every 15 minutes. Sample rates are typically on the order of one sample a second, maybe two to four samples a second, depending on the instrument, for minutes, every 15 minutes. You can imagine you are bringing back a fair block of data.

The shipboard surveys made use of this guy. This is a profiling conductivity temperature depth sensor right here, CTD. It also has a series of bottles on it. So as I send this down to measure temperature salinity over the vertical, I can draw water samples. You can bring the water samples back and use them to calibrate the other instruments.

I actually have a sample of water now with some amount of suspended material in it. I can filter it down, and I can see what the OBS is telling me and where it's right or wrong. The optical back scattering probes, okay?

At each of the stations where we stop to use the CTD we got water samples, but we also got sediment samples, grabs, bring them back and take a look at what the sediments are at those stations. There are much, much more extensive sediment maps out there. These are supplementary measurements to the sediment maps.

The U.S. Geological Survey has done an extensive high-resolution survey of sediments in this area. We know the sediments in Eastern Long Island Sound very well, okay? (next slide) This is the data recovery for temperature and salinity. That was that CTD probe that was on the frame, currents and suspended sediments, that's Nortek and the OBS, and this is waves. That's the RDI. And we start off with different campaigns. These are coming down running through this.

To make a long story short the data recovery was something in excess of 50 percent depending on what you happen to look at, and in some areas, sometimes it was 100 percent. But in some times this guy gave us 66 days, and we were out there for 66 days so it worked all the time, but this guy gave us nothing. That was courtesy of the manufacturer.

This was an instrument that was sent back to the manufacturer for refurbishment before being put out, and they put the wrong firmware in it. It came back brand new, well paid for, no work, okay? You will also notice this 6A/B here. That we get out here campaign one, the Nortek, 25 of the 66 days, here 28 of the 66 days.

There were two things going on here, the main one being that the frame got tipped over. It got tipped over one and a half times, and then we were smart enough to move it after that. We generally try to pass the word out among the fishermen so that they know where the gear is, and it's been a very successful approach over the years, but somehow this guy managed to get bumped.

The other thing it was that in the first campaign you see this all 25 of 66. This was a learning curve on the batteries and what the batteries could do, and we expected them to last for the 60 days. They didn't last for the 30 days. That's why you got 25 days of recovery.

But overall if you look through this, the data return is very, very good and certainly provides us with more than enough data remembering how we're bursting and frequency that we're sampling during the burst to calibrate the model. Let's take a look at some of the results. This is the RDI ADCP mean velocity. You are going back, You are going forth, you are going back, You are going forth, you are going back, You are going forth, and every little bit you get a little bit further along.

There is a mean in the velocity field. It ain't just sloshing back and forth. Some of that temperature salinity effects, some of the wind effects give us a net, and that shows up in the means, okay? So the stuff will go up as you saw in the movie the way the plume was moving back and forth.

If you take a look at it, in my case when I'm not tied to the river, I might be moving one way or the other. In this case what the data are showing you is that if you set it at this point, the net transport would be to the northwest. Here it is slightly more west of north, and here it is more like southwest, southwest, southwest, well, west, call it northwest, got it, with the three different colors being the three different campaigns.

The net drift near bottom, what this is saying the net drift near bottom water column, we are 3 meters off the sea floor, is into The Sound. A typical estuarine pattern you expect bottom waters in the estuary to be moving in. Fresh water on top is a little bit lighter, a little bit less dense. Sitting on top, it runs out. So if it's running out, it's got to be running back in to keep the water in The Sound. Typical transport.

If you get down closer to the bed, this is a Nortek matter, (pointing to another slide) looking at that three-quarters of a meter to the bed, same sort of thing roughly. You know, if you take a look in a little more detail, there are now going to be six arrows, because we went out and recovered data twice during each campaign -- these on the bottom, okay? Basically the same sort of a pattern.

The main thing, the message to take home here it is a typical estuarine flow coming in at the bottom, and a magnitude, how about that one? These little arrows are worth 10 centimeters a second if they're about that long. Capish? 10 centimeters a second? Nah. Come on. You don't have to lie to me. 10 centimeters a second, fast or slow?

MR. JOHNSON: Fast.

DR. BOHLEN: I got a fast. One knot, one nautical mile per hour 6,080 feet per hour, okay? 50 centimeters a second, 5-0, one knot. You can call me a liar if you want to (inaudible). One knot, 50 centimeters a second, so 10 centimeters a second is not all that fast, but it's persistent. It's persistent, okay?

Again, back to that, we get a feel for this thing, you know, what's sticking, what's not sticking, what's fast, what's slow. It's important. Okay. So you are looking at net drifts that run on the order of 10 centimeters a second, 5 to 10 centimeters a second, and you can figure out what that means in terms of net transport over the course of a day.

This is probably not entirely necessary, (next slide) but this is the tidal ellipse over the vertical. This is the average over the whole of the vertical, and it just shows you that if we were tracking the tide the way this thing goes and it's on the flood, it would be going that way, and then we wait six hours or so, and little by little the tide starts to drop off in speed, but it changes direction. With me?

Little by little over the course of a half an hour or so it's dropping in speed and changing in direction before it goes back onto flood. That's what you are looking at here, the so called tidal ellipse. The major axis of the tidal ellipse going off here to the southwest, more to the west of southwest, okay? Here a little bit more northwest, northwest, and the magnitudes running in here on the order of half a meter per -- 50 centimeters a second, a knot.

So you got that guy there, I don't know, call it from here out, maybe a knot and a half in that neck of the woods as the major axis, okay? So, again, you pretty well have that in mind, and you saw it pretty well in the movie going back and forth, this magnitude, and this shows you there really wasn't much difference for all of the seasonality that we were looking for in terms of the behavior of the system from campaign 1, 2 and 3, not all that much difference in terms of the tidal ellipse. Okay.

Real quick what this is showing we were looking here at the wave conditions, significant wave height at the station off Montauk, okay? Block Island, Montauk sitting here, this guy in here, and we're looking to see what the effect of the waves are on the bottom shear stress, and to make a long story short what these data are showing, despite the fact there is a significant difference here in wave characteristics, there isn't that much difference in bottom stress, okay, as you come along in this.

It's an interesting curve in the tracking. We can get into this later whether its tracking logarithmically over the vertical or not. Next slide. Now that makes sense. One thing I didn't tell you, when I showed you that slide of the zone of siting feasibility, there was around the perimeter a gray area. That's an exclusion area. That's thought to be more or less coincident with the areas that are going to be influenced by waves. So its variously estimated at being something like 17 meters.

DR. HAY: 18 meters.

DR. BOHLEN: How many.

DR. HAY: 18 meters.

A. 18 meters, he says. We were arguing yesterday about 17 or 18, 18 meters. So it ends up around 60 feet or so, alright? So it's not terribly surprising when all of our instruments are outside of that that the response to the system, to the waves, is not all that great, okay?

This just shows another area -- to show you that we've got a real spring neap cycle in the boundary shear out here, okay, that we don't see a lot of kick up in the shear as we change the waves, and we're getting up to 2 meter waves here, significant wave height. That's a significant wave height. The average of the one-third highest waves, that's not the maximum wave, so you can get almost twice as much. The maximum heights are almost twice as much as that.

So, again, you pick up the spring neap cycle pretty well in this, but it doesn't show up very much in terms of wave response, okay? (next slide) This is a comparison between two methods to calculate the boundary shear stress, and the one you saw was the so called bulk formulation. That we take the drag coefficient times the square of the velocities. That's the bulk formulation.

There is another way to do it, and you argue whether it's better or not so good, and that's the log in here. And if there was a perfect fit between the two, it would be on this one-to-one line down here. Well, you see that we're coming along calculating the stress levels using the two techniques, and they're pretty close, you might slide that over a little bit, until we get up to a stress level of about one Pascal, and at one Pascal it starts to dive off.

We could sit here and argue with you about why it's diving off. It would take another half an hour to explain the differences in the change of the flow field, what happens when you get up here, why the velocity profile may not be logarithmic at that level. But suffice it to say what we're using this little calculation for is to demonstrate at least to us the adequacy of the drag coefficient of 0.0025, which was the selected drag coefficient that was used in the formulation you saw earlier.

So the data do a pretty good job of verifying that selection until you get up to a point where nobody is surprised that it doesn't work, to put it in plain language, okay? So this is a very valuable set of data. If you take a look at this, you don't often get a chance to really get down into the nuts and bolts of the flow field.

MR. ALLYN: So the coefficient gives the best fit between the two models. Is that how you have the coefficient?

DR. BOHLEN: The coefficient was a selected value. Well, there is a lot of data to say it ought to be that value, and then the question is does it make any sense.

MR. ALLYN: Yeah.

DR. BOHLEN: And now you are comparing the results of a bulk formulation that uses that coefficient against a different way of calculating the stress, okay? Alright. So here we go. The rubber hitting the road. The model simulation says here we reproduce tidal and spring neap variations on the observed stress. Now, you saw some of the spring neap variation -- spring neap, do you understand that? Twice monthly variation in the tide, right?

We're just off the full moon. We're in the spring portion of the monthly tide. It has nothing to do with April, May, March, whatever it is, okay? This is twice a month. You got a new moon, and you got a full moon, and you have maximum tide during the new moon, maximum tidal range during the full moon, and in between smaller range -- neap, okay?

So you are looking at the spring neap cycles here coming along this guy, and then you are looking at a comparison, and I realize it's a little difficult to see here between the field observations the calculated values and the model values. And to make a long story short on this one we argue, using these sorts of data, that the model is doing a pretty good job of reproducing the measured results, which is what, of course, we were trying to verify. And next time we will have a different color for you. The blues and reds and pinks and purples are hard to see. Okay, next.

This is very good here. This is another comparison between the two. This is your bulk formulation again, that equation, okay, and these are the field observations.

DR. MCCARDELL: No.

DR. BOHLEN: I'm sorry. The other way around. These are the field observations and that's the model. We have it upside down and that's the model, and this is the mean of the boundary shears, okay? And then if they were identical, they would lay on the one-to-one lineup here, and what you are looking at this is now mean values over the period.

Correlation coefficient of about 0.91, which is very high. When you start looking at the maximum predictions, this gets a little more scattered in there, but it's still pretty close to the one-to-one. In this case it gets down to a 0.7 -- 70 percent. So you put that together with Grant was saying about the accuracy of the model, the accuracy of the comparison of the two, and it's looking like we've got a pretty good handle on the boundary shear stress in the model, okay?

What's it all mean? So we want to find the maximum bottom -- so we're now using the model, because the model gives us information on all those little triangles, every quarter mile a little square, okay, over the whole of the field. Compare the value of the sites identified in the screening process and simulate a period of a severe storm. We picked Sandy. Go ahead.

The bathymetry. You know it, right? Fairly deep in The Race, not so deep near shore. You got the net depth coming back up. Six Mile on the end (west). I don't think you need to see anymore. These guys know this by heart, okay? So here you are in terms of stress distribution. This is Pascals. Red is high, on the order of 3 or maybe down in here, okay? Montauk not terribly surprising. Some places in the vicinity of The Race, some reds, fair amount of yellow, and some amount of blue, low.

As far as the zone of siting feasibility goes, remember where that is going, come back over to see Block Island, okay? You got your Point Judith sitting over in here. It says that there is a fairly high stress level particularly in the Eastern Sound through much of the zone of siting feasibility, okay? You are up in here.

Remember we were cutting things off looking at values something like 0.75 as being something of a critical value for some of the sediments we might be playing with in terms of dredged material. The -- one of the things that's interesting here is that as we run this through the different campaigns, that the spatial differences we see between -- here's an area, you know, Long Sand Shoal at the mouth of the Connecticut River and Block Island Sound, you look at the spread, it's quite a spread in stress values. That spread is much larger than you will see seasonally, much larger than you will see seasonally.

So that says that, to me that the tidal field is important, and that the differences we're seeing are down in the subtle -- you will see some of the subtle things in a minute -- but subtle as in changing mean flow characteristics. That little 10 centimeters a second interacting with the mean flow of a knot or knot and a half, may be substantial -- may have a substantial effect.

So snapshot picture of the whole thing. This is maximum bottom stresses during campaign 3. We picked campaign 3, because that's the supposed to be the highest energy winds in winter, and then we picked our storm conditions, okay? Next.

Here are some of the numbers. We broke it down by Eastern Long Island Sound and Block Island Sound, and you see the Cornfield Shoals site generally has the highest stress. Probably not terribly surprising. For those of you who have played down there you know it's mostly sands, and that from a management standpoint over the years we counted it as a dispersal site, and there is good reason for it when you take a look at the stress values.

Look at the range as you go through Six Mile, Clinton, Orient Point, back to Orient Point, Niantic Bay, and here is New London, okay? All values below 0.75. Get out, Fishers Island, east-west and center. This is south of Fishers Island around what I call the deep hole, okay? So there are values in there. Fishers Island center it looks pretty low, okay? Might even get east looking low relative to what we see in The Sound. Block Island yet lower. North of Montauk, low. North of Montauk is really Montauk Harbor, really in there. It's in the shelter. Okay, next.

So we took a look at Sandy, see what we could do with it. Sandy was a fairly interesting event, right? Blew a little bit. These are our

MYSOUND buoys out there, Ledge, Central Long Island Sound, Western Long Island Sound, Execution Rocks, and not surprising the Ledge shows the highest, about 60 knots or so, okay? Very short period.

So it was a wind event, short lived. We know that. What you don't know, what this thing doesn't show you one of the unique things about Sandy of course is that it may not have blown all that much max, but it blew a lot for a long time, and that is significant duration, unusually long duration, and a lot of that was from the southeast, which made for interesting conditions through a number of our areas, right?

And if you take a look at the fetch, the over-water distance in which the wind can act, for Eastern Long Island Sound southeast is favorite. East nearly, northeast not so much; but certainly southeast has the potential for influencing what's going on down here.

So it was good from that standpoint, fairly reasonable winds and significant duration, and a storm surge which increased water depths through the whole system, right? This guy is Kings Point (pointing to a slide). This guy is New London. So there is New London. You had a surge of something under 2 meters, about 1.5 meters - 5 to 6 feet, a surge down here, which has a recurrence interval of every 10 to 30 years. You know, we will see it again, that kind of a thing.

You get down the western Sound, oh my goodness, look at the western Sound. Four meters down at Kings Point, and, you know, in New York Harbor it was even more. Occurrence intervals down there are hundreds of years. We won't get into an argument about how many hundreds of years. In fact, we discussed that, but it's very, very low probability.

What should you care? Because you stuffed a lot of water down my Sound, okay? You piled up a lot of water down the western end of The Sound and that water's got to get out. That water coming back then has the potential to influence the velocity field in the eastern Sound, and from that standpoint that much water heading back out this way makes Sandy an unusual event, and we're very fortunate to be able to take a look at some of the numbers on it, okay?

It may be that there is a lot of subtle influences. It may be that it was the wind field does more to that data. We will see. We will take a look at it. But people talk about the frequency of occurrence of Sandy down here just in terms of wind and maybe storm surge. That's one way to think about it. But we're out in The Sound now, and what we care about is the amount of water that was produced in this and where it went and what it is going to do to us if it starts going back out. Okay.

So to make a long story short, if I showed you that earlier slide with the yellows and blues on stress, and I showed you this guy here now, this is Sandy's effect. About the only difference you are going to see it says created higher maximum bottom stresses in some areas. Well, now it turns out if you looked at the absolute numbers on the table -- I'll show it to you in a minute. I don't expect you to memorize the last table.

I'm telling you what we're looking at is, for the most part, each one changed a little bit. Some fair number of them went up a little bit. But in terms of the deeper water effects they weren't as great as you might expect. Most of the effects we're looking at higher stress in the shallow areas near shore, which given the wind field, you know, you don't need a model to tell you that probably. Okay, next.

So here we are. About the same distribution of stress. And if you went down and compared this set of numbers with the earlier set of numbers, you'd see just what I told you. You still got Cornfield Shoals as the winner, New London as the lowest end on the Eastern Long Island Sound sites. And if you run down this guy here, about the same. Now you are getting down Fishers Island center, Fishers Island east, it's still below your 0.75. This guy went up quite a bit, the west, as you might expect. The same thing for the Block Island Sound site. It went up. Next?

So it's defined as a level of stress that's got to be mobilized, and I figured that we were using a cutoff for the sake of screening of about 0.75 pascals. That's going to vary depending on the stuff you are playing with. The more cohesive, it's going to take more stress. The sandier, if you bring me out a beach sand, it's going to take less, okay, and a variety of other factors, too.

If you just get me in talking about the biological effects. Okay. Those damn bios messed up the texture of my sediment. They burrowed into the sediment, and so the physical oceanographer has to be sensitive to the biology, but that's affecting the uppermost layer of the sediment column, and it has been shown over the years to be a relatively minor effect. They build themselves little cocoons to stay put, okay? Next.

If you do that -- why don't we -- This is the comparison. Basically what you are looking at here we just split up what you just saw into areas that were greater than one Pascal, 0.75 to 1 Pascal and less than 1 Pascal, and you got Block Island Sound, New London, Fishers, Orient Point, Fishers Island east and north of Montauk as the sites that are below 0.75. The remainder were above 0.75. Okay.

MR. JOHNSON: Are you going to talk about capacity in any of these sites?

DR. BOHLEN: No capacity. Just -- with the exception of depth that is included in the model, what's out there is what's out there.

COURT REPORTER: Sir, can I have your name, please?

MR. JOHNSON: John Johnson.

COURT REPORTER: Thank you.

DR. BOHLEN: So before I gave you different shadings from the reds to the blues, right, browns to the blues. Here we just -- everything that's above 0.75 is in brown, and you can see this is maximum bottom stress exceeding during the simulation of Storm Sandy, okay? What are you looking at is Sandy. And as I said, if we did this for the non-Sandy, you're not going to see all that much of a change. You are going see some change but not all that much of a change.

What impresses you here is that there is a lot of brown. That's fine. What does it all mean to us? This guy. It says sites 1, 2 and 7, Cornfield Shoals, Six Mile and Fishers Island. Fishers Island - West, that's south of the island, have high maximum stresses. You saw that. Orient Point, that's Orient Point, Block Island Sound show maximum stress levels below at the center of the site but have values in excess of 0.75 within the boundary.

So there is some variation maybe the way the triangles were placed. We can argue about it. Niantic Bay and Clinton Harbor show maximum stresses exceeding 0.75 but less than one. We can sit and tune this later, but that's what the model is showing you right now the way it's laid out. New London disposal site is the only site in the Eastern Sound with a maximum bottom stress below 0.75. That's what we did, that's how we did it, and that's what we found. Questions?

DR. HAY: So we have 35 minutes or

so for questions and comments. Please speak up, and also please mention your name and any affiliation up front.

MR. CAREY: Drew Carey. Frank, the sediments on the bottom are obviously going to integrate the shear stress over time, and you didn't see a lot of effect from the wave climate in general because of the water depth.

DR. BOHLEN: Yeah.

MR. CAREY: So really the tidal prism and the bathymetry is what's driving a lot of the distribution of this shear stress, I would guess. Do you expect to see pretty reasonable correlation between those model shear stresses and the kinds of sediments that will be seen on the sea floor in different locations?

DR. BOHLEN: In a general sense, yes. That is to say if I was to draw you that stress diagram from Central Long Island Sound to Montauk, you would see that in general the stresses are lower in the western part of that down toward Central Long Island Sound than in the east.

And if you look at the sediments in general, once you get across Mattituck Sill, you tend to find softer sediments that have accumulated. Out in the Eastern Sound, it may be somewhat coarser on the bottom on average. So a simple correlation might be there except for the fact that I can also bring you to a number of locations in the Eastern Sound right in The Race where you have very fine grained deposits that are quite stable. And when you go down and you put your flippers into it, you are amazed that because you are dragging along trying to stay there that this stuff stays put.

The sediments there are classes of fine grained sediments, and the majority shows this behavior when stress can really build up resistance to movement. So the simple correlation is very often hard to realize. You will find high energy flows and fine grained deposits out there. Is that what you are looking for?

MR. CAREY: Yeah, and so a little follow-up is that presumably based on characterization of dredged material you chose fine sand as kind of the driver that gave us this 0.75 Pascal.

DR. BOHLEN: Right.

MR. CAREY: If you shift down to say very fine sand or a slightly more complicated mix of grain sizes, you could get those materials to the bottom, get them to stay in place in slightly higher shear than necessarily this.

DR. BOHLEN: Absolutely. What we're looking at here, this is the conservative.

MR. CAREY: Right.

DR. BOHLEN: I don't know how you class the conservative anymore, but --

MR. CAREY: Go ahead. Call me a conservative.

DR. BOHLEN: Now, what we have up here, 0.75, you can probably find that same material staying put in stresses in excess of one. I would say we really want to have that stuff -- we would be sure that that stuff is going to stay. That's use 0.75. I don't know whether that's liberal or conservative.

DR. HAY: Any questions? Comments?

MR. ALLYN: Compliments to you and your staff. That was amazing.

DR. HAY: Thank you.

DR. BOHLEN: I want to emphasize two things. This continues to be a work in progress, because the next step on this whole thing is to quantify the sediment transport. So we got a pretty good understanding of the velocity field and the shear that's associated with it.

Now we want to try for the sediment

transport model so we give you some ideas of the probability of movement, and then again what he said, Grant said about where the stuff is going to go so we're not finished yet. And then for those who haven't asked the question, I asked the question about when I heard about it.

The next step in this whole business is so you have established some background for exposure. The swimmer is down there, and there is some mud that's looking at going by. What about the effects, the biologicals, where the movement of the mud and the movement of the mud where the constituents may be impacting the benthic community or the water column. So the biological study has also yet to be done so it's very much a work in progress.

MS. MCKENZIE: Tracey McKenzie. I'm curious as to what your schedule is for your next sediment transport modeling.

DR. BOHLEN: You want to answer that.

DR. HAY: Well, the sediment transport modeling is -- there are two elements that are still being worked on. One is an LTFATE, long-term sediment transport model and a short-term sediment transport model. Maybe Grant, you want to elaborate on that quickly.

DR. MCCARDELL: I have to refer you to Professor O'Donnell who is out of town as far as that's concerned. We're working on both of those projects.

DR. BOHLEN: The reason that I laugh is soon is all we ever hear. So I can't tell you that it's December 16 or whatever, but all of this I think as you saw in the schedule is going to have to be quickly addressed to get things finished off by next spring.

DR. HAY: In other words, there is still modeling that is taking place at this time.

DR. BOHLEN: Right.

MR. JOHNSON: John Johnson. Is this --

DR. HAY: Do you have an affiliation.

MR. JOHNSON: Yeah, I'm sorry, CMTA. Is this the only input that's going to determine the relocation sites and sediment dump sites? We take offense in the Marine industry to calling them dump sites. I think they should be called property relocation sites.

That all being said the question is

does -- what other additional information is going to be inputted to those people who are going to, you know, designate some other sites?

DR. BOHLEN: Jean.

MS. BROCHI: Again, I can take that and I can answer the capacity question as well. So the capacity of the potential disposal sites, the dredged material disposal sites, potential sites, not dumping sites, the capacity and dredging needs is part of the Environmental Impact Statement as well as biological characterization, the physo (physical oceanography), sediment, economics.

And all of that will be pulled together in an environmental consequences. It will be evaluated along with no alternative, which means what happens if we don't -- there are no sites that are available.

MR. JOHNSON: How far along are you in the studies of those other factors?

MS. BROCHI: This is one of the major studies that we just completed. That's why we're having this public meeting. Biological resources we have some information. We have a literature search on, the dredging needs capacity. We have the Corps of Engineering finalizing that report right now, and it all will be compiled into the document, which will be the draft.

MR. JOHNSON: And your deadline is December of next year.

MS. BROCHI: 2016 for the final.

MR. JOHNSON: January 1, 2016?

MS. BROCHI: December 2016 is the final, rulemaking and --

MR. JOHNSON: That's two years.

MS. BROCHI: Yes. We're coming out in the spring with the draft so that's probably the date that you will hear from us, and we will have a public meeting.

DR. HAY: Next up is -- next up is Bill, actually, sorry.

MR. SPICER: Bill Spicer, Spicer's Marinas. Also a member of the Connecticut Marine Trades and a member of the Stakeholders Commission who is supposed to comment on the DMMP. I noticed a couple, three things. All of us have been looking at the NY DOS failure of consistency for some of our dredging permits. Mine has been out for eight years, since 2006, and continuously renewed very faithfully and is in force.

But it recently was declared, after

208 days, to be nonvalid. That it was not consistent with what New York had. It's very interesting the site 6 tests out very, very nicely when you're putting real scientific data out with real oceanographic studies and real oceanography running, and it shows that the NLDS is doing very well.

Now, I know we're in here, because we're supposed to be designating one or more sites in Long Island Sound, which is kind of interesting, because in some of the NY DOS claims where they are claiming inconsistency, they have located NLDS as northeast of the basin of Long Island Sound.

Now, what that would mean The Race runs out in two deep valleys that kind of make a V. The eastern one runs in through past Race Rock and between there and Fadden and comes out to about where Bartlett's Reef is and swings west. The other one is further west over by Little Gull Island, between there and Fadden.

Now, I contended in a bound paper that I submitted to Mike Keegan very early in this that the NLDS was in Fishers Island Sound. It's not down in the valleys and canyons. It's up on the top of the plateau, and it's not subject to Ambro. It's subject to 404 waters and regular Army Corps of

Engineers analyses the same way as is occurring in every other estuary in the country.

But we got singled out in 1980 by an amendment slipped through Congress by Representative Ambro of New York aided by -- out of the guy's own mouth, because he was bragging at a Holiday Inn in New London in 2006 that he aided Ambro in doing it, and his name was all over the coastal zone management sheet, and he happens to be employed by NY DOS, and both of these were sneak attacks without any particular notice to Connecticut's waterfront stakeholders.

And I also have a document from NOAA that says that they were very surprised that Connecticut didn't object to New York's -- or it seemed that way to me -- coastal zone management. But you know what? There weren't any comments against that being extended. You know why? We didn't know about it, because I believe that rumor has it, and the best information I can get was they're supposed to notify the Army Corps of Engineers.

What Army Corps of Engineers did they notify? New England? No. It's believed they sent it to New York. I can't prove that, but I sure know that there wasn't anything that I can find that's here in New England except that when I -- I found out about it in the afternoon, and I went to DEP the next morning to challenge it, because I was furious.

We have been opposing Ambro for 32 of 36 municipalities to have water go up and down in Connecticut, tidal water, 32 of 36 opposed Ambro in print and wanted it repealed.

MS. BROCHI: Okay. So I am going to -- you bring up two good points I did want to mention, actually. So Mike Keegan -- you sent something to Mike Keegan. He's working for the Corps of Engineers on -- he's joining us on this effort, but that's the Dredge Material Management Plan, which is a separate effort, which I didn't mention tonight, and I think most of you are familiar with that.

They will also be having public meetings coming out with the programmatic EIS and documentation for that.

MR. SPICER: For the record I submitted that timely with a request for that. I think it was in December of '06. It was undated on the actual document. It was about that thick with white covers and spiral bound.

MS. BROCHI: Okay.

MR. SPICER: I can provide more

copies.

MS. BROCHI: I mean, we can talk --

MR. SPICER: That's okay, continue, continue. You're doing fine.

DR. BOHLEN: As far as our designation of the site, I mean what we classed as Eastern Long Island Sound versus outside of Eastern Long Island Sound had nothing to do with political jurisdictions and boundaries.

MR. SPICER: The Corps put $7 million of signs in by 2005 and then got a political decision where something was rammed down our throat here in Connecticut, and people weren't happy, and during the midst of this NOAA was kind of surprised. It seemed to me that nobody objected.

But when I got to DEP, I found that Gina McCarthy knew all about it, and she did find a way on one of the other things to shut me up. There was a letter from her deputy, Amy Marella, that told me to -- you know, I kind of got stabbed in the back about Ambro, and she had a way of shutting me up that was interesting. She looked me in the eye --

MS. BROCHI: I apologize on behalf of the agency --

MR. SPICER: Wait a minute. She

looked me in the eye and she said I wrote it. That's I, Gina McCarthy, wrote it. So I shut up. If it was a man, I'd address her in spades. A woman, I shut it up and turned around and decided that I had been really stabbed in the back --

MS. BROCHI: So --

MR. SPICER: -- and I haven't shut up since.

MS. BROCHI: So one other point that you made was about the DOS coastal zone consistency, and so they do have that authority. If anything is abutting, they can make comments on projects. If it is project specific, they have it within the regulatory agencies, the Corps and EPA, will handle that separately. This is -- I mean, if you have anything specific about this --

MR. SPICER: Yep, I do have it --

MS. BROCHI: -- process --

MR. SPICER: -- specific with NY DOS.

MS. BROCHI: Okay.

MR. SPICER: They're inconsistent. Did they say where in New London NLDS is? NLDS is in Fishers Island Sound.

MS. BROCHI: We --

MR. SPICER: Some others have made some errors, but that one may be crucial.

MS. BROCHI: Okay. So we do have a representative as part of our cooperating agency group here today. Mike Zimmerman is here. Can you speak to any of this or should they -- is there somebody else you can refer them to?

MR. ZIMMERMAN: Well, is there a specific question, I guess?

MR. SPICER: There is a statement that they have made contentions that are incorrect.

MS. BROCHI: So that --

MR. SPICER: They have had plenty of practice at making incorrect ones, and I have corrected them on numerous occasions, and I think we need to put it on record here that NLDS is in Fishers Island Sound and is 404 waters, and they have admitted it, and I call it if it was legal, it's an admission against interest. Where they have admitted, it's northeast of the eastern basin of Long Island Sound.

MS. BROCHI: Okay. So, Mike, would it be appropriate for Jennifer to receive something then?

MR. ZIMMERMAN: I'm sure she would be happy to.

MS. BROCHI: So if you want to submit official comments to DOS, Jennifer Street would be the contact.

MR. SPICER: At the moment I have cooperated, because I am being threatened standing on my air hose and I'm a diver. That I would go to Central this time, but that doesn't mean that they don't come in here and be honest with the folks.

MS. BROCHI: Right.

MR. SPICER: You got to tell them. In short, we have been jocked a couple times.

MS. BROCHI: Thank you.

DR. BOHLEN: Susan.

DR. HAY: I want to get some more comments, though.

MS. BURNS: Kathleen Burns, CMTA. I just wanted to follow-up on JJ's point when you were discussing impacts that would be weighted, the impacts that you are or not impacts, I apologize, but the different, the various studies that will be entered into this impact study. Are those weighted?

MS. BROCHI: Sorry, could you just say your affiliation?

MS. BURNS: Oh, I'm sorry, Connecticut Marine Trades Association. So there is the physical. There is the biological. You had mentioned economic. What else is weighed in there?

DR. HAY: Archaeological.

MS. BROCHI: Archeological, cultural, economic. Then --

MR. JOHNSON: Capacities.

MS. BROCHI: Capacities is part of the development. It's not really weighted.

MS. BURNS: Are these weighted in any sort of fashion?

MS. BROCHI: No. The data is all selected. The site screening process is what we go through, evaluating where the sites are. So that's -- it's not weighted. It's more of a screening tool that we use. The final document will evaluate all of those equally.

DR. BOHLEN: But -- I don't know anything about evaluating documents. I'm saying if you came in here and you said a site that you are going to use is already full, that makes that classification pretty way up.

DR. HAY: Similarly if you had a site that's on a shellfish bed, that would be --

MS. BROCHI: Right. That's part of the screening, too.

MR. HELBIG: Jean, Frank, Ron Helbig.

COURT REPORTER: I'm sorry, sir, your name again?

MR. HELBIG: Ron Helbig, Connecticut Marine Trade Association, and the whole discussion has been about physics and about the stress on the bottom and site 6. Can either one of you talk to the effect that why is site 6 not considered a very good site based on all the data that you have here and the lack of stress that's on that site and speak to the fact that why that shouldn't continue to be a designated site?

MS. BROCHI: So I will take that, if you don't mind.

DR. BOHLEN: Yeah.

MS. BROCHI: So, again, so the part of the effort is to look at all of the sites, and what I had presented originally is we had started, you know, just eastern, open wide. We decided to go to historic sites, because we really weren't familiar with what had gone on with -- the Corps of Engineers had helped us.

So we included historic sites. We included active sites, which includes the currently,

currently used sites. And so part of the investigation is to look at all of the data. This is the first big chunk of data, and so we narrowed it down to the six sites, and so all of those six are going to be evaluated. So we're in the process of collecting data on all of those.

MR. HELBIG: My only question to you is just here tonight can you say from an educated opinion that the site 6 is something that we should be strongly fighting for because of the temperament of the currents on the bottom and the ability for the material to stay in that location?

MS. BROCHI: So what I can -- I don't -- I can't prejudge, and we have to evaluate all of the data as it comes in so -- but what I can say is based on the physical stress and what we set out in the Notice of Intent to look at is a containment site for the type of sediment that's in Long Island Sound and based on the dredging needs report that the Corps of Engineers produced in 2009.

Based on that report we determined, when we came out with the Notice of Intent, that we would look for a containment site. Cornfield Shoals is clearly -- and this proves it -- a dispersive site. So we're -- we need a containment site, and we're looking at all of them, and we won't make a decision until we evaluate all of --

MR. HELBIG: But you don't want to share an opinion at least or --

MS. BROCHI: I do not want to share an opinion.

MR. HELBIG: Okay. I get that.

MS. BROCHI: Sorry.

DR. HAY: Sir, go ahead.

MR. SHAPIRO: My name is Jeffrey Shapiro. I'm from Cedar Island Marina. My concern is with the grade size used for your modeling, as the gentleman back here spoke about, was a sandy material, and in my experience almost all of the material that I see that goes out of waterfront facilities in Connecticut is a lot siltier material. Siltier material is going to be much more stable then the way you were talking, much more stable on the bottom than a sandier material.

So my only concern is with some of the evaluations you have done that you might tend to come to a conclusion that the material is going to move when in fact if you had used siltier material for your examples, you might come to a different conclusion, the conclusion that the material is not going to move.

DR. BOHLEN: Okay.

MR. SHAPIRO: Like I said in Connecticut most of the material I see going out is a lot siltier, because if somebody has a waterfront facility and they have sand that needs to be removed, they're probably not going to be putting it in the barge and dumping it out to sea. They're going to be selling it to somebody. So that's my comment is that maybe --

DR. BOHLEN: I guess my response to that is don't get ahead of yourself.

MR. SHAPIRO: Okay.

DR. BOHLEN: And hear what was said. This is the study of the physics of the field and the development of a model that allows us to evaluate transport. You did a straw man evaluation. You went and picked a number. It ain't 10 and it ain't 0. How about 0.75? Where did 0.75 come from?

Joe Germano did some work down in a site down in Long Island Sound, and his numbers come up looking like 0.75. There is a study in the North Sea that -- the numbers come up looking like 0.75. It's not 1 and it's not 0.25. Okay. So we used it for screening. If it was this absolutely, what would we be seeing? It's the beginning of the process.

The next step in this whole thing is to refine it, and that's where the model starts coming in where you really do take a look at how the sediment is responding. You give me a much more complete set of data than grain size. I want both density, bulk density, I want sediment characteristics that go beyond simple grain size, and I can then talk to you about not this particle-by-particle movement that you were looking at in this first slide, which is unrealistic given all of the sediments I have seen in Long Island Sound but on the beach. If I'm off the beach, I got gooey stuff even if it's sandy, okay?

We build that into the model, and we come up with a much more accurate and quantitative evaluation of the transport potential. What you are looking at right now is just the beginning, screening. It's the beginning.

MS. BROCHI: And I'm going to add to that a little bit. So this effort is to designate one or more or none disposal sites, right, dredged material disposal sites. It doesn't mean automatically that dredging will happen, that projects will go out there. That happens from the regulatory agencies on a project-by-project basis all the time so we're very familiar. The Corps of Engineers are back there, the EPA. I review the projects. We're very familiar with the type of sediment in Long Island Sound and the dredging needs.

Now, one thing I had mentioned earlier is the DMMP effort, which is separate from this. Well, as part of that effort they collected information on dredging needs. They looked at upland disposal and other beneficial uses and alternatives. Those documents are also going to be used in this evaluation. And so whenever they're, you know -- the object is to try to use sandy materials beneficially wherever, whenever possible.

DR. HAY: Okay.

MR. SHAPIRO: Not too often.

MS. MCALLISTER: Abbie McAllister, Saybrook Point Marina. We're basing -- the people who are going to be basing their decisions on things like Cornfield Shoals based on your model that you completed when it seems with all the data you have we have specific data on what type of sediment has been disposed at Cornfield Shoals for the last, I don't know, 20 years --

DR. BOHLEN: Sure.

MS. MCALLISTER: -- because we have

all had to have that tested specifically. Couldn't you plug those exact numbers into your model so that we would get a more realistic idea of what's being put into Cornfield Shoals rather than judging it as sand? I know I'm not putting sand in Cornfield Shoal. It's a fine sediment, and that's on record with the DEP.

DR. BOHLEN: I'm sorry, you're not putting sand in Cornfield Shoal.

MS. MCALLISTER: It's a fine sediment, because we have to have it tested every time we dump there.

DR. BOHLEN: Well, you can get --

MS. MCALLISTER: Every two years we dredge.

DR. BOHLEN: What's the use of the Cornfield Shoals area? George?

MR. WISKER: Cornfield is a dispersive site.

DR. BOHLEN: And what's the major source of the material that goes into Cornfield Shoals historically?

MR. WISKER: Connecticut River.

DR. BOHLEN: Connecticut River sediment.

MS. MCALLISTER: We're not putting

sand --

DR. BOHLEN: I know you are not putting sand, George.

MR. WISKER: It's not always sand.

MS. MCALLISTER: We know exactly what has been put there. Couldn't we use those (inaudible)? Wouldn't that give us a better idea of just --

DR. BOHLEN: And we can also look at the mounds at New London the same way and the mounds at central Long Island Sound the same.

MS. MCALLISTER: We have done so much research it would seem that it would be easy to pull that into this whole thing.

DR. BOHLEN: I forgot to tell you 45 years. Did I tell you that?

MS. MCALLISTER: I believe it. I'm just saying it seems like you have taken such detail with everything else that it would be not that much more difficult to use what's been approved for that in the past.

DR. BOHLEN: And we are and we are.

DR. HAY: Yes?

MR. MCGUGAN: Hi, Christian McGugan, Gwenmor Marina and Gwenmor Marine Contracting. One thing I was wondering -- I think this kind of speaks to what Bill Spicer was talking about -- are any of these proposed sites outside, because I don't even know what the delineation is between a coastal zone management area and a non-coastal zone management area?

And the reason I ask are any of these sites outside of the coastal zone management, because I think the fear is that the recent trend of DOS objecting to all the projects in southeastern Connecticut, because Bill's was the first, and we have heard the storms coming, and it seemed like it's coming. They used to just sit on their comment for 180 days and then Army Corps would assume consistency issue of the permit.

Well, things they seem to have changed starting with Bill, and like I said we have heard the rumblings that this is coming. So effectively what they have done for private projects is shut down the New London dump site, okay? Now, I'm a dredge contractor. I have projects on the Connecticut River including Abbie's.

I was telling her today next time she dredges, Saybrook Point Inn dredges, you probably are going to have to go to Central, because New York is going to object. So I guess the fear is that you guys do all this hard work and come up with this new site or these new sites, and we say hooray. We have a place to go.

We apply for our permits to dredge, and New York can still just object, and that sets off an appeal process and a legal process that no small marina operator can bear, and no small marina operator can bear to go to central Long Island with their spoils, and I have been to some of those dredge management meetings, but I can barely stomach it as a dredge contractor, which I'm sure Jeff knows as well.

When they talk about alternative disposal methods, I mean, there is electric cars invented in the '50s, but we're still filling up with gasoline. That's the best analogy I can make. So as far as the affordability of getting rid of dredge spoils in these other crazy ways that I have heard, it's just not reality.

So anyway, I think that's the fear. So are any of the proposed sites -- is there anyone in this room from Army Corps? Are they all going to be within the coastal zone management, and this could all just be --

MS. BROCHI: So the zone site of

feasibility includes those sites. The 11 sites are all within the coastal zone management consistency and that's Connecticut and New York. So either Mike or George, if you have any specific information? To my knowledge there is no -- you know, there is no yardage or mileage that, you know, gives you preference to being able to object or not. It's whether it's abutting and whether it's in danger.

MR. WISKER: I think what we're getting is within Long Island Sound it's either, you know, they're all territorial waters of one or the other state. Boundary lines match. An example of where you might be outside of the coastal zone is say Rhode Island where you got far enough off into the territorial seas beyond the state territorial limits. Then -- and that may be where it would apply. You would have to go quite a ways off shore, open water.

MR. CAREY: You have to get away from Rhode Island's territory.

MR. WISKER: That's what I'm saying. You have to go out and hang a right. So that would be the one way you would avoid, because under the Federal consistency laws the two states within Long Island Sound if there is a reasonable, foreseeable effect of a project in one state on another, that other state has the right to remove that for consistency with that program.

MS. BROCHI: Thank you.

MS. MCKENZIE: Tracey McKenzie again. Just to follow up the question with you, George, because the New London disposal site now, a corner of it, the boundary of New York and Connecticut goes right through, I think, like the lower third corner of --

MR. WISKER: Southeastern.

MS. MCKENZIE: Southeastern corner of it. If the site was shifted so it's not on the boundary line, New York would still be able to comment on the coastal action that Connecticut DEEP takes.

MR. WISKER: Right.

MS. MCKENZIE: I just want -- that's all.

DR. HAY: Tracey, what is your affiliation.

MS. MCKENZIE: U.S. Navy Subbase, New London.

MS. BROCHI: Does that answer your question?

MR. MCGUGAN: Just for the record,

to go to New London for Bill Spicer, the cost for him to try to go to Central with the same material, because I was his dredge contractor, and I'm not here because I'm sore about not dredging this job. It's a much bigger issue to me. The difference between going to New London or going to Central with this stuff is more than double the cost for a marina operator.

So it's going to be a huge burden on the marinas in southeastern Connecticut, and the Connecticut River is like coming. So I guess somehow --

DR. BOHLEN: When you say cost, you are including all factors in the cost. It isn't just dollars.

MR. MCGUGAN: Right. Well, I have actually done --

DR. BOHLEN: Is that right --

MR. MCGUGAN: We have done trips. Ron, he couldn't because (inaudible) is too shallow. So we did a couple loads and tried to be as nice as I could, but, man, it's a long trip. It's 24, 26-hour cycle to get out to New Haven and back. So it's just -- that's the economics of it. It's just like, you know, you are digging with a wheelbarrow in your yard. You are going right there, and you are going to your neighbor's house. It's just --

MS. BROCHI: All of the regulatory agencies and cooperative agencies understand the economic impact, but the State doesn't.

MR. MCGUGAN: Well, I think New York and Connecticut needs to get along or -- maybe Connecticut needs to understand what is acceptable.

DR. HAY: So it's 5 o'clock. We started five minutes late so let's allow for five more minutes, so maybe two more comments that are burning. Sir?

MR. SHAPIRO: My name is Chris Shapiro from Cedar Island Marina. Is just hasn't -- maybe there is an answer to this, but it hasn't been entirely clear to me. You say, you know, in the calculations, you know, there is going to be a lot of variables, you know, such as economic, you know, commercial, that type of thing. Who on your team is going to be considering those variables?

MS. BROCHI: Well, there is individual people at EPA as well as the Corps of Engineers and all --

MR. SHAPIRO: Well, you guys are scientists. Who from the business side is going to be considering this? I mean, surely, you know, I'm not going to get up here, you know, and talk about, you know, the displacement or anything like that. So how can you guys talk about business?

MS. BROCHI: You will have an opportunity to comment about --

MR. SHAPIRO: No, no. Who on your who is actually putting together the actual recommendations?

MS. BROCHI: Yeah, well, so the recommendations come from the agency and the cooperative agencies, but the working group that was set up for the DMMP has nonregulatory and nonagency specific focus on it that we're going to tap into as well.

MR. SHAPIRO: So there are people from the business side, too.

MS. BROCHI: Yeah.

MR. SHAPIRO: Obviously this is very important, you know, but there obviously needs to be some professionals, you know, that understand, you know, the economic, you know, impacts. I know that you guys are probably very smart, but there needs to be professionals, you know.

DR. HAY: We have an economist on board as well.

MR. SHAPIRO: Can you give me their names?

COURT REPORTER: I'm sorry?

DR. HAY: Ben Lieberman.

MR. SHAPIRO: Ben Lieberman?

MS. BROCHI: So on the working group, Mark, do you know when the next working group of the DMMP would be established or --

MR. HABEL: Probably about the time we publish the draft of the DMMP.

MS. BROCHI: So Mike Keegan would be the contact.

MR. SHAPIRO: Okay. I'd just like to ask --

DR. BOHLEN: Did I hear -- Jean, you said after the DMMP or after --

MS. BROCHI: No, the Dredge Material Management Plan.

DR. BOHLEN: What's the date for the release of the Dredge Material Management Plan?

MR. HABEL: It will be sometime in the spring.

MR. JOHNSON: Of 2015?

MR. HABEL: Yes.

DR. BOHLEN: I know there was some

questions on that that had been circulating.

DR. HAY: One final question? Comments? Okay. Thank you all for coming. Have a great afternoon.

(Whereupon, this hearing was concluded at 5:10 p.m.)

CERTIFICATE OF REPORTER

I, Jacqueline V. McCauley, a Notary Public duly commissioned and qualified in and for the State of Connecticut, do hereby certify that the Supplemental Environmental Impact Statement(SEIS) to

Evaluate the Potential Designation of One or More Dredged Material Disposal Site(s) in Eastern Long Island Sound hearing was taken on December 9, 2014 at 3:08 p.m., and reduced to writing under my supervision; that this hearing is a true record of the testimony given during the hearing.

I further certify that I am neither attorney nor counsel for, nor related to, nor employed by any of the parties to the action in which this hearing is taken, and further, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, or financially interested in the action.

IN WITNESS HEREOF, I have hereunto set my hand and affixed my seal this 18th day of December, 2014.

Jacqueline V. McCauley
Notary Public

My Commission expires: 12/31/2017